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IX. *A Description of the solvent Glands and Gizzards of the Ardea Argala, the Casuarius Emu, and the long-legged Casowary from New South Wales. By Sir Everard Home, Bart. F. R. S.*

Read December 17, 1812.

HAVING, upon a former occasion, laid before the Society an account of several varieties in the structure of the solvent glands and gizzards of birds, I now avail myself of some further materials, which I have procured since that time, to render the series more complete. The *Ardea Argala*, a native of Bengal, which feeds upon carrion, and is exceedingly voracious, has the solvent glands differently formed from those of any bird which I have examined; each gland is made up of five or six cells, and these open into one common excretory duct. The glands are disposed in two circular masses, one on the anterior, the other on the posterior surface of the cardiac cavity, putting on a similar appearance to those of the cormorant, but differing both in structure and situation. The gizzard of the *Ardea Argala* is lined with a horny cuticle, nearly of the same general appearance as that of the crow, and the digastric muscle is of similar strength. These parts are represented in the annexed drawing. (See Plate III.) This bird has a large bag hanging down on the forepart of the neck, which is rendered conspicuous by the skin that covers it being almost entirely without feathers, having only a few scattered on the most prominent depending part. The bag appears to

be readily filled and emptied at the will of the bird : upon examination after death, this bag was found to contain air, and to be unconnected with the organs of digestion, or the trachea which passes down along the middle of its cavity ; it communicates by a large oval aperture with the air cells on the posterior part of the neck, and through them receives air from the lungs. The two species of casowary, *Casuarius Emu*, and the long-legged casowary from New South Wales, differ from one another in the form of their digestive organs, as well as in the length of their intestines.

In the *Casuarius Emu*, the solvent glands are oval bags one fourth of an inch long and only one-sixteenth of an inch wide ; they occupy the whole surface of the cardiac cavity which is very large, and they are all placed nearly in a transverse direction respecting the cavity, the orifices of the excretory duct appearing very distinctly through the membrane which lines the cardiac cavity. The gizzard is nearly of the strength of that of the crow, but has a thicker cuticular lining. This cuticle extends beyond the cavity of the gizzard both above its orifice and downwards towards the duodenum. The most remarkable circumstance respecting the gizzard, is its being situated out of the direction of the cardiac cavity, forming a pouch on the posterior part, and having before it an open channel lined with cuticle, along which the food can readily pass into the duodenum without being received into the gizzard, as in other birds. At the commencement of the duodenum there is a broad valve, upon the edge of which the cuticular lining of the cavity of the gizzard terminates. The duodenum, at its origin, swells out into an oval cavity four inches long, and two and an half in diameter ; it then contracts to one inch and a half in dia-

meter, and the intestine afterwards continues nearly of that size.

In the long-legged casowary from New South Wales, the solvent glands are of the same length as those of the Emu, but are twice the width; they occupy the whole surface of the cardiac cavity, in the middle line of which there is a row of these glands in the direction of the cavity, and on the two sides the glands are arranged in an oblique direction towards this line. The gizzard is rather stronger than in the Emu, but resembles it in all other respects. The duodenum at its origin is by no means so large.

The annexed drawings (See Plates IV. V.) shew all the parts in so distinct a manner, as to make a more particular description of them unnecessary; and I feel myself much indebted to the kindness of Mr. HOWSHIP, who, in the absence of Mr. CLIFT, took the trouble of making them. His knowledge of comparative anatomy has enabled him to execute them in a much more satisfactory manner than could have been done by any artist who was not at the same time an anatomist.

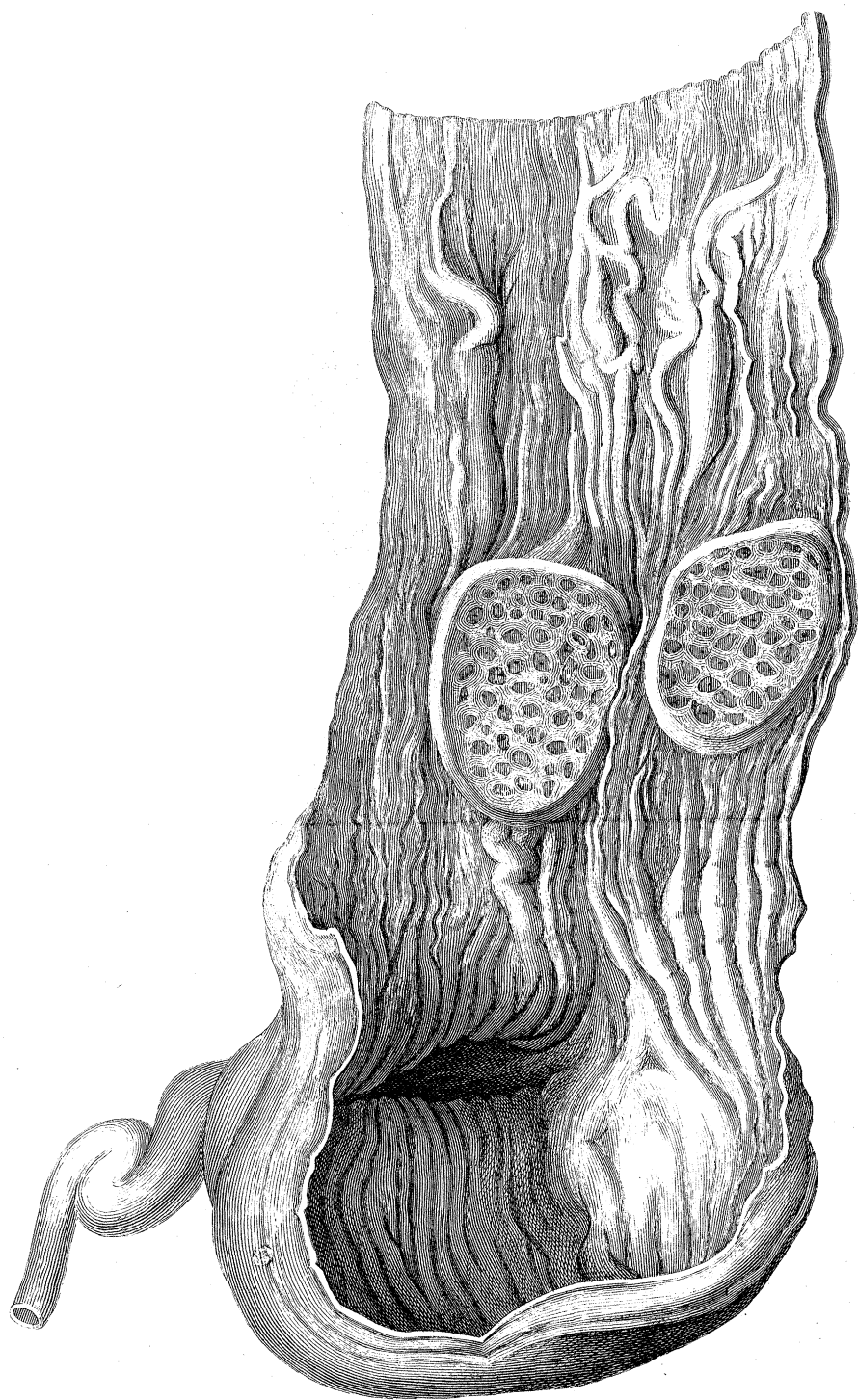
It is a very interesting part of comparative anatomy to examine the digestive organs belonging to birds, between which there is a similarity in size, food, and habits of life; and to trace the varieties in structure by means of which each species is enabled to subsist upon the produce of the country, of which it is the natural inhabitant, with every possible advantage. This cannot be better illustrated than by the following examples.

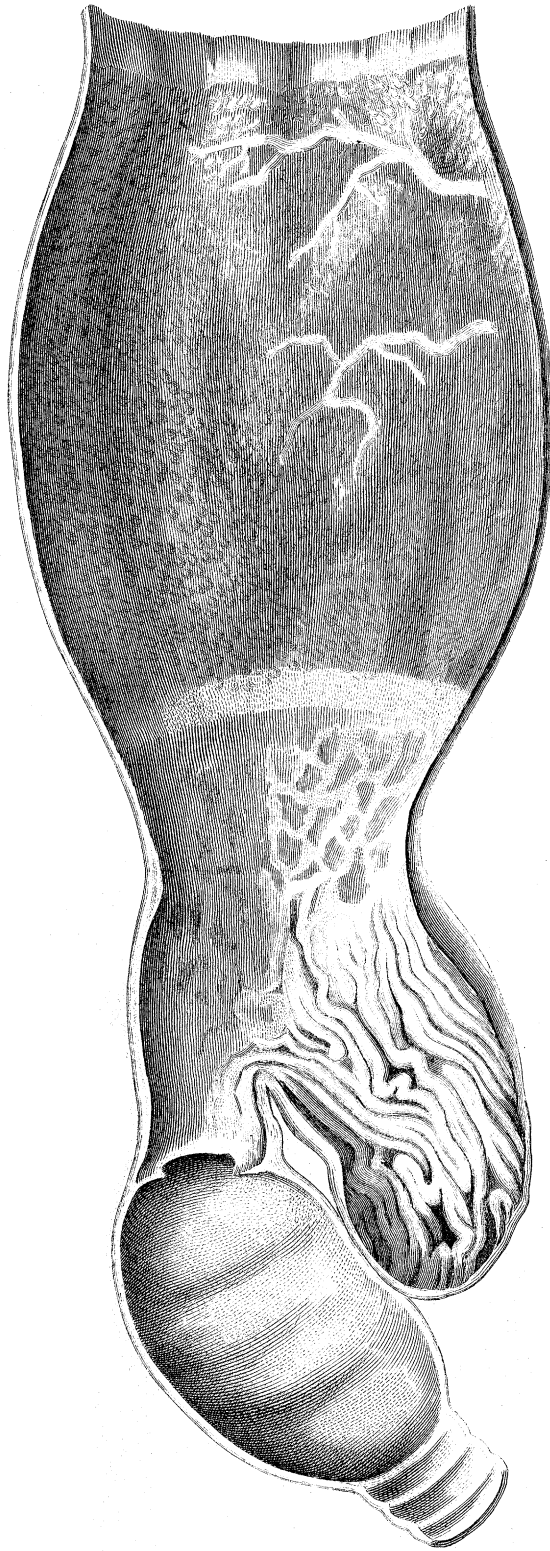
The Casuarius Emu, a native of Java, one of the most fertile and luxuriant islands in the world, has the solvent glands

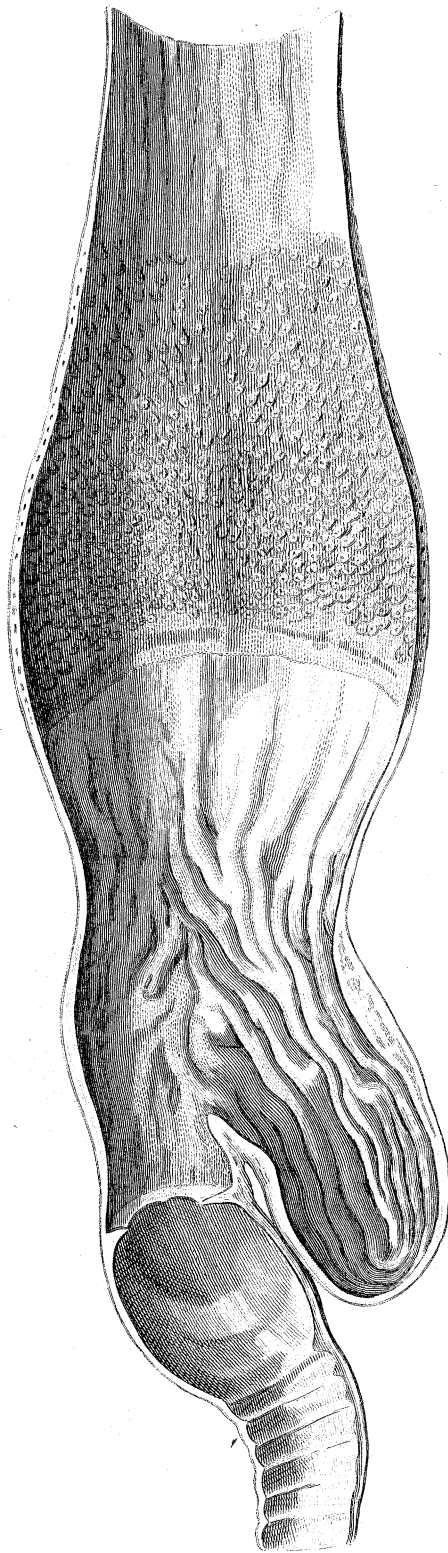
of a very small size; the gizzard so situated as only to be used occasionally; the small intestines five feet long, two inches in diameter, and the great intestine one foot long, making in all six feet; and two cæca, each of them six inches in length, one-fourth of an inch in diameter. The Casowary of New South Wales, a less fertile country than Java, has larger solvent glands, a stronger gizzard placed under the same circumstances; the small intestines one inch and a quarter in diameter and ten feet seven inches long; the large, two inches in diameter, thirteen inches long, in all thirteen feet; the cæca two inches long, and half an inch in diameter.

The Rhea Americana, a native of South America, where its food is not abundant, has solvent glands of an unusually complex form, and a strong gizzard, so placed that every part of the food must be trituated in it. The small intestines one inch in diameter, ten feet seven inches long; the large intestine one inch and a quarter in diameter, one foot eight inches long, in all twelve feet three inches; but to these are added two cæca, each of them three feet ten inches, and two inches in diameter at the widest part.

The Struthio Camelus of Africa, which in the Desert has a very precarious subsistence, has solvent glands of the same structure as in the Rhea Americana, but much more numerous; a much stronger gizzard, so situated that the food must undergo a previous trituration before it can arrive at it; the small intestines one inch and a half in diameter, and twenty-seven feet long; the large intestine two inches in diameter, and forty-five feet three inches long, in all seventy-two feet three inches; and two cæca three inches in diameter at the widest part, and each two feet nine inches long.







In this series of structures, we have not only the gizzard becoming more and more fitted to economize the food as the country becomes less fertile, but we have also an extension of the lower intestines, and cæca, to such a degree as to lead to the belief that the processes carried on in them, render the undigested food subservient to the animal's support.